

REMARKS

Claims 1-8 are amended, no claims are canceled, and no claims are added; as a result, claims 1-10 are now pending in this application.

No new matter has been added through the amendments to claims 1-8. Independent claims 1 and 4 have been amended to, among other minor amendments to the language, change the preamble of these claims from "A circuit comprising:" to "An apparatus comprising;" and to include the phrase "a circuit including" in the body of the claims. Claims 2-3 and 5-7 have been amended merely to comport the preamble of these claims to the independent claims from which these claims depend. Independent claim 8 has been amended merely to correct obvious typographical errors in the language of the claim.

Objections to Claims

Claim 8 was objected to due to informalities.

Claim 8 has been amended to replace the word "fist" with the word "first," and to replace the word "an" with the word "and" in two places. It is believed that this objection is obviated by the amendments made herein to claim 8.

Applicants respectfully request withdrawal of the objection to claim 8.

§101 Rejection of the Claims

Claims 1-10 were rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. Applicants respectfully traverse the rejection of claims 1-10.

Applicants submit that claims 1-10 include statutory subject matter that falls within at least one of the four enumerated categories of patentable subject matter recited in 35 U.S.C. § 101, which states:¹

Whoever invents or discovers any new and useful **process, machine, manufacture, or composition of matter**, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
(Emphasis added).

¹ See 35 U.S.C. § 101.

Further, the MPEP states:²

B. Determine Whether the Claimed Invention Falls Within An Enumerated Statutory Category

To properly determine whether a claimed invention complies with the statutory invention requirements of 35 U.S.C. 101, **USPTO personnel must first identify whether the claim falls within at least one of the four enumerated categories of patentable subject matter recited in section 101 (i.e., process, machine, manufacture, or composition of matter).**

In many instances it is clear within which of the enumerated categories a claimed invention falls. Even if the characterization of the claimed invention is not clear, this is usually not an issue that will preclude making an accurate and correct assessment with respect to the section 101 analysis. The scope of 35 U.S.C. 101 is the same regardless of the form or category of invention in which a particular claim is drafted. *AT&T*, 172 F.3d at 1357, 50 USPQ2d at 1451. See also *State Street*, 149 F.3d at 1375, 47 USPQ2d at 1602 wherein the Federal Circuit explained:

The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to -- process, machine, manufacture, or composition of matter -- [provided the subject matter falls into at least one category of statutory subject matter] but rather on the essential characteristics of the subject matter, in particular, its practical utility.

For example, a claimed invention may be a combination of devices that appear to be directed to a machine and one or more steps of the functions performed by the machine. Such instances of mixed attributes, although potentially confusing as to which category of patentable subject matter the claim belongs, does not affect the analysis to be performed by USPTO personnel. **Note that an apparatus claim with process steps is not classified as a "hybrid" claim; instead, it is simply an apparatus claim including functional limitations.** See, e.g., *R.A.C.C. Indus. v. Stun-Tech, Inc.*, 178 F.3d 1309 (Fed. Cir. 1998) (unpublished).

The burden is on the USPTO to set forth a *prima facie* case of unpatentability. (Emphasis added).

² See the Manual of Patent Examining Procedure (MPEP), Eighth Edition, August 2001, Latest Revision August 2006, § 2106 IV.B.

Applicants respectfully submit that claims 1-10 clearly fall within at least one of the four enumerated categories of patentable subject matter recited in section 101, and thus comply with the statutory invention requirements of 35 U.S.C. § 101. By way of example, but not limited to this example, independent claim 1 as now amended includes:

An apparatus comprising:

a circuit including a discrete-time FIR (Finite Impulse Response) filter comprising n multiplier units to implement a filter response $[\bar{h}(t)]_i$, $i = 0, 1, \dots, n-1$, where t is a time index, the FIR filter to filter a discrete-time sequence of input voltages $x(t)$ to provide a sequence of filtered output voltages $z(t)$ where $z(t) =$

$$\sum_{i=0}^{n-1} [\bar{h}(t)]_i x(t-i); \text{ and}$$

a data generator coupled to the discrete-time FIR filter, the data generator to provide a discrete-time sequence of desired voltages $d(t)$, $t = 1, 2, \dots, T$;

wherein for $t = 1, 2, \dots, T$, the filter response satisfies an update relationship $[\bar{h}(t+1)]_i = [\bar{h}(t)]_i + \mu [\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}] \text{sgn}\{x(t-i)\}$, $i = 0, 1, \dots, n-1$, where, μ and K are scalars and $\text{sgn}\{\}$ denotes sign. (Emphasis added).

Thus, independent claim 1 includes a circuit including a discrete-time FIR (Finite Impulse Response) filter, and a data generator coupled to the discrete-time FIR filter. At least this subject matter, as included in independent claim 1, provides subject matter within one of the four enumerated categories of patentable subject matter as recite in 35 U.S.C. § 101. The fact that independent claim 1 also includes mathematical formulas or calculations does not render the claim non-statutory, as suggested by the Office Action. As is clearly stated in the MPEP as quoted above, "Note that an apparatus claim with process steps is not classified as a 'hybrid' claim; instead, it is simply an apparatus claim including functional limitations."³ Therefore, the apparatus as claimed in independent claim 1 is not rendered non-statutory by the inclusion of mathematical formulas or calculations.

Further, the Office Action has not shown how independent claim 1 is directed to *no more than* an abstract idea, a natural phenomena, or a law of nature. Here, independent claim 1 is

³ See *Id.*

directed to an apparatus including a circuit, and thus is not merely an abstract idea, a natural phenomena, or a law of nature.

Still further, since independent claim 1 is directed to an apparatus, and not merely an abstract idea, a natural phenomena, or a law of nature, the statements in the Office Action wherein - "The claim does not create a physical transformation or produce a useful concrete result"⁴ - are not applicable, as these tests are only used to determine whether claims that do fall under one of these judicial exceptions may still qualify for patent protection. Since independent claim 1 does not fall into the category of being *no more than* an abstract idea, a natural phenomena, or a law of nature, these tests are not necessary or required in order to qualify independent claim 1 as statutory subject matter under 35 U.S.C. § 101.

In another example of statutory subject matter, independent claim 4 as now amended includes:

An apparatus comprising:

a **circuit including a discrete-time FIR (Finite Impulse Response) filter** to filter a discrete-time input sequence of voltages $x(t)$ where t is a discrete-time index, to provide, for $t = 1, 2, \dots, T$, a

voltage indicative of $z(t) = \sum_{i=0}^{n-1} [\bar{h}(t)]_i x(t-i)$ where $[\bar{h}(t)]_i, i =$

$0, 1, \dots, n-1$ are n weights indexed by t ;

a **data generator coupled to the filter** to provide a discrete-time sequence of desired voltages $d(t), t = 1, 2, \dots, T$;

a **latch circuit coupled to the filter** to provide, for $t = 1, 2, \dots, T$, a voltage indicative of $\text{sgn}\{z(t) - Kd(t)\}$ where K is a weight and $\text{sgn}\{\}$ denotes the sign function;

a **digital summer coupled to the filter** to provide, for $t = 1, 2, \dots, T$, n voltages indicative of $\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}, i = 0, 1, \dots, n-1$,

a **digital multiplier coupled to the filter** to provide, for $t = 1, 2, \dots, T$, n voltages indicative of $\mu[\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}]\text{sgn}\{x(t-i)\}, i = 0, 1, \dots, n-1$, where, μ is a weight;

a **digital summer and a delay element coupled to the filter** to provide to the FIR filter, for $t = 1, 2, \dots, T$, n voltages indicative of $[\bar{h}(t)]_i + \mu[\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}]\text{sgn}\{x(t-i)\}, i = 0, 1, \dots, n-1$ so that for $t = 1, 2, \dots, T$ the weights $[\bar{h}(t+1)]_i, i =$

⁴ Applicant do not agree with or admit that the claims do not create a physical transformation or produce a useful concrete result, as suggested on page 2 of the Office Action. However, since these tests are not required in order to qualify the claims as statutory subject matter under 35 U.S.C. § 101, these statements are not addressed in this response.

$0, 1, \dots, n-1$ are given by $[\bar{h}(t+1)]_i + [\bar{h}(t)]_i + \mu[\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}]\text{sgn}\{x(t-i)\}$, $i = 0, 1, \dots, n-1$.

Thus, independent claim 4 includes a circuit including a discrete-time FIR (Finite Impulse Response) filter, a data generator coupled to the filter, a latch circuit coupled to the filter, a digital summer coupled to the filter, a digital multiplier coupled to the filter, and a digital summer and a delay element coupled to the filter. For reasons analogous to those stated above with respect to independent claim 1, and the additional subject matter as included in the claim, independent claim 4 provides statutory subject matter under 35 U.S.C. § 101.

Claims 2-3 and 5-7 depend from one of independent claims 1 and 4, and so include all of the subject matter included in the independent claim from which they depend, and more. For at least the reasons stated above with respect to independent claims 1 and 4, claims 2-3 and 5-7 provide statutory subject matter under 35 U.S.C. § 101.

In a further example of statutory subject matter, independent claim 8 as now amended includes:

A computer system comprising:

a board comprising a first transmission line and a second transmission line; and

a receiver coupled to the first and second transmission lines, the receiver comprising:

a discrete-time FIR (Finite Impulse Response) filter comprising n multiplier units to implement a filter response $[\bar{h}(t)]_i$, $i = 0, 1, \dots, n-1$ where t is a time index, the FIR filter to filter a discrete-time sequence of input voltages $x(t)$ to provide a sequence of filtered output voltages $z(t)$ where $z(t) = \sum_{i=0}^{n-1} [\bar{h}(t)]_i x(t-i)$; and

a data generator to provide a discrete-time sequence of desired voltages $d(t)$, $t = 1, 2, \dots, T$;

wherein for $t = 1, 2, \dots, T$, the filter response satisfies an update relationship $[\bar{h}(t+1)]_i = [\bar{h}(t)]_i + \mu[\text{sgn}\{d(t)\} - \text{sgn}\{z(t) - Kd(t)\}]\text{sgn}\{x(t-i)\}$, $i = 0, 1, \dots, n-1$ where μ and K are scalars and $\text{sgn}\{\}$ denotes sign. (Emphasis added).

Thus, independent claim 8 includes a board comprising a first transmission line and a second transmission line, and a receiver coupled to the first and the second transmission line. Applicants respectfully submit that the board, the first transmission line, the second transmission

line, and the receiver are not merely a set of calculations without practical application, as suggested in the Office Action.⁵ Further, at least this subject matter, as included in independent claim 8 provides statutory subject matter that falls within one of the four enumerated categories of statutory subject matter under 35 U.S.C. § 101.

Claims 9-10 depend from independent claim 8, and so include all of the subject matter included in independent claim 8, and more. For at least the reasons stated above with respect to independent claim 8, claims 9-10 provide statutory subject matter under 35 U.S.C. § 101.

For at least the reasons stated above, the Office Action fails to meet its burden for setting forth a *prima facie* case of unpatentability with respect to claims 1-10. Applicants therefore respectfully request reconsideration and withdrawal of the rejection, and allowance of claims 1-10.

If the Examiner maintains the 35 U.S.C. § 101 rejection of any or all of claims 1-10, Applicants respectfully request that the Examiner identify the feature of the invention that the Examiner believes would render the claimed subject matter statutory if recited in the claim or claims, as prescribed by the MPEP.⁶

Reservation of Rights

In the interest of clarity and brevity, Applicants may not have addressed every assertion made in the Office Action. Applicants' silence regarding any such assertion does not constitute any admission or acquiescence. Applicants reserve all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicants do not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicants timely object to such reliance

⁵ See the Office Action at page 2, paragraph 2.

⁶ See MPEP, the last paragraph in § 2106 IV.B.

on Official Notice, and reserve all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicants reserve all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Conclusion

Applicants respectfully submit that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicants' attorney ((612) 371-2132) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 13th day of April 2007.

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